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BULLETIN

OF THE

TORREY BOTANICAL CLUB

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Vol. 45 No. 4

BULLETIN

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TORREY BOTANICAL CLUB

APRIL, 1918

New species of Hawaiian plants

JOSEPH F. ROCK

(WITH PLATE 6)

1. **Cyanea Giffardii** sp. nov.

A tree 5–10 m. tall with a single trunk 15 cm. in diameter near the base, gradually tapering towards the apex, bark smooth, grayish green, with scattered leaf-scars, woody zone thin near the apex of the trunk, the medullary cavity septate by chartaceous diaphragms; leaves obovate-oblong, about 50 cm. long and 12–15 cm. wide, broadest portion in the upper third, margins strongly undulate and minutely denticulate, appearing sinuate, due to strong undulation, subentire with exception of the base, which is unevenly lobed, acuminate at the apex, mucronate, gradually tapering at the base into a stout petiole 3.5–6.5 c n. long, thin, subchartaceous, dark green and shining above, pale and dull underneath, midrib stout and prominent as are the lateral veins, the latter arcuate and united with other arcuate veins near the margin, the whole surface of the leaf covered with a pellucid reticulate net work, glabrous above, pubescent underneath, especially on the midrib and veins; peduncles axillary, drooping, stout, terete, glabrous, 10–16 cm. long or slightly longer, about 1 cm. thick, distantly bracteate the entire length, the upper bracts linear, 15–30 mm. long, 3–5 mm. wide, rounded and mucronate at the apex, bracts less distant towards the apex and also smaller; flowers on pedicels 2–3 mm. long with three small, acute bractlets at the base and dorsal side of the flower; calyx glabrous, dark purplish black, tube obconical, usually seven-ribbed, with two

[The BULLETIN for March (45: 93–132, *pls. 4, 5*) was issued April 1, 1918.]

tubercles at the base, 18 mm. long, 15 mm. wide; calycine lobes broadly triangular, acute, 5 mm. each way, with broad sinuses intervening; corolla strongly arcuate, 7–8 cm. long, glossy, glabrous, dark purplish outside, slit at the back three fourths its length only when fully mature, the five lobes of the corolla entirely connate; staminal column protruding, perfectly glabrous, pale, anthers glaucous, glabrous, the two lower only penicillate; style black, the stigmatic hairs encircling the stigma, the latter yellowish tinged with purple; flowers usually ten on a peduncle, crowded at the apex; fruits globose, nearly 25 mm. each way, dark purplish black, locules small, each containing from six to twelve rather large whitish seeds; milky juice of the plant yellowish. [PLATE 6.]

HAWAII: in the forest on the windward slope of Mauna Loa, near Glenwood at 22 miles, along the Homestead Road at an elevation of 2,200 feet, August 27, 1917, *W. M. Giffard 12802*, (flower buds) in the herbarium of the College of Hawaii; along the Volcano Road at 23 miles, in wet forest, September 1, 1917, *Rock & Holm 12802b*, (flowering and fruiting specimens), TYPE, in the herbarium of the College of Hawaii.

This very remarkable plant, which is closely related to *Cyanea superba* (Cham.) Gray, differs from it in the pubescent, deeply undulate leaves, which are lobed at the base instead of being entire; in the glabrous, much shorter peduncle, and in the glabrous deep purplish black flowers and fruits. *Cyanea superba* occurs on the island of Oahu in the gulches of Makaleha and Mt. Kaala, while *Cyanea Giffardii* occurs on the southernmost island of the group. It is also much statelier than *Cyanea superba*, as it reaches a height of thirty feet, with a single crown of leaves at the apex. It grows in company with *Antidesma platyphyllum* Mann, *Labordia*, *Cyrtandra*, *Straussia hawaiiensis* Gray, *Strongylodon lucidum* Seem., *Clermontia parviflora* Gaud., *Cibotium Menziesii* Hook. and *C. Chamissoi* Kaulf., the last two being the common tree ferns of the region.

When the species was first discovered by Mr. W. M. Giffard, in whose honor it is named, only two plants were observed, one with large flower buds and the other without flowers, the latter plant divided into three branches at the apex, on account of an injury. The mature type specimens, with flowers and fruit, were collected on the road to Glenwood and the Volcano, at an elevation

of 2,400 feet. The largest plant seen was thirty feet in height. The plants are difficult to see in the forest as the trunk, which is usually covered partly with moss, does not branch and the crown of leaves is hidden amongst the foliage of other trees.

Cyanea Giffardii may be Hillebrand's β var. of his *Cyanea arborea* from the woods of Hilo, Hawaii. The writer is well acquainted with *Cyanea arborea* and can only state that the new species is exceedingly different from the latter, and that it comes much closer to *Cyanea superba*. *Cyanea arborea* has a much larger and denser crown of leaves, which are sessile, and linear-oblong; the peduncles are much longer and the flowers are very thin, narrow and slender, suberect and whitish to gray.

2. **Cyanea rollandioides** sp. nov.

Plant 1–1.5 m. high, stem simple, fleshy towards the apex, woody towards the base, stem muricate to spinose in the upper portion; leaves obovate-oblong, acute, fleshy when fresh, papery when dry, dark green above, paler underneath, but with dark purple midrib and veins and a prominent dark purple reticulate network, puberulous or glabrous on both surfaces, but more or less covered with spines on both sides, those of the upper surface yellow, those of the lower surface deep purple, margins eroso-dentate to irregularly notched, and somewhat uneven-sided at the base, 30–50 cm. long, 8–15 cm. wide in the widest portion, which is in the upper third, on fleshy stout spinose or muricate petioles, 8–15 cm. long; racemes glabrous, peduncle 3–6 cm. long, naked three fourths its lower length, but distantly covered with scars of fallen flowers, bearing in its upper fourth about fifteen flowers; bracts subulate, 3 mm. long, supporting each pedicel, the latter filiform, 10–25 mm. long, bibracteolate, the bracteoles alternate, one at about the middle of the pedicel the other near the apex, 0.25 mm. long; calyx tube turbinate to obovate-oblong, 7–10 mm. high, the linear calycine lobes as long as the tube; corolla deep purplish red or purple to pale yellowish white with dark purplish streaks, moderately arcuate, broadest at the middle, 5–8 mm., about 4.5 cm. long, thin and glabrous, dorsal slit very shallow, extending only one fourth of the length of the tube or a little beyond the two upper linear subulate lobes, the three lower lobes a little shorter; staminal column glabrous, as are the pale greenish anthers, the lower ones only penicillate; fruit unknown.

HAWAII: Forest of Puna in dense woods along the Kalapana Road, not far from Pahoa, September 3, 1917, *Rock & Newell*

12831 (flowering specimens), TYPE, in the herbarium of the College of Hawaii.

This rather variable species is remarkably like a *Rollandia*. The plant varies considerably in the spinosity of the leaves, petioles and stems; some of the specimens almost approach *Cyanea noli-me-tangere* Rock in spinosity, while others are only muricate. The color of flowers is also variable, ranging from pale yellowish white with deep purplish streaks to entire dark purple. It is difficult to state to what known species the plant is closest related; in habit it approaches *Rollandia lanceolata* Gaud., but actually seems to come close to *Cyanea noli-me-tangere;* from the latter it differs in the long-petioled leaves, which are much larger, and in the longer naked peduncles which are not spinose. The plant as a whole is much larger in every way, the flowers are purple as are the veins and midrib of the leaves; the whole inflorescence is glabrous. *C. noli-me-tangere* is very loosely foliate, while *C. rollandioides* is simple-stemmed and has at its apex a dense crown of leaves, this feature bringing it under the section *Palmaeformes*.

The plants grow in the wet forests of Puna on Hawaii, a little-explored district and one of the most primitive regions on the island of Hawaii. A stalwart Hawaiian gave the writer the native name *Aku-aku* for the species in question, of which he said that the leaves were cooked with meat and eaten like cabbage. The name *Aku* alone is applied to *Cyanea tritomantha* Gray, to which our plant has no resemblance. The species was collected in company with Brother Matthias Newell, of Hilo, an ardent naturalist.

3. **Rollandia angustifolia** (Hillbrd.) sp. nov.

Rollandia longiflora β var. *angustifolia* Hillbrd. Fl. Hawaiian Isl. 246. 1888.

Stem smooth, 1–1.5 m. high, leaves linear-lanceolate, 18–35 cm. long, 2.5–3.75 cm. wide, thick, fleshy, dark green, glossy above, pale whitish underneath, with dark purplish midrib and veins, acuminate, mucronate at the apex, gradually narrowing at the base into a fleshy petiole 2–4.5 cm. long, glabrous on both sides; racemes slender, 3–4 cm. long, four- to five-flowered; pedicels thin, about 14 mm. long, bracteate at the base, bi-bracteolate about the middle; calyx turbinate, 1 cm. long, the apex truncate-dentate, or oftener lobed, the calycine lobes acute, of irregular length, usually

3 mm. long, with a median nerve; corolla deep purplish red, 7–8.5 cm. long, 1 cm. wide, the lobes 1.5 cm., the dorsal slit extending one fifth the length of the tube; staminal column glabrous adherent up to about the middle of the corolla, the anthers glabrous, the lower only bearded; fruits globose, crowned by the tubular limb of the calyx, which disappears at the maturity of the fruit.

OAHU: Mt. Konahuanui trail, Palolo Valley, Mt. Olympus, and Manoa Valley, Kalihi Valley, January, 1870, *W. F. Hillebrand*, without number, in Berlin Herbarium; June 14, 1908, *H. L. Lyon 8816* in the herbarium of the College of Hawaii; September, 1912 and 1914, *J. F. Rock 10250a*, *10250b*, in the herbarium of the College of Hawaii.

The plant in question is certainly worthy of specific rank. Young plants which the writer observed were of the same habit as mature ones, both having linear-lanceolate leaves, while the true *Rollandia longiflora* Wawra has sinuate leaves when young and also when in a mature state. *R. angustifolia* differs mainly in the linear, entire, minutely denticulate leaves, which give the plant an entirely different appearance from that of *R. longiflora*.

4. **Lobelia oahuensis** sp. nov.

Plant rather stout, stem short and thick, solid and not hollow; rosette of leaves very dense and about 1 m. in diameter; leaves densely packed around the apex of the stem, linear-oblong, acuminate at both ends, merging at the base into a winged fleshy petiole about 2.5 cm. in length, 50 cm. long, 4.5–5 cm. wide, thick, coriaceous, dark green, glabrous above and covered with a strongly impressed, very close, reticular net work, young leaves densely hirsute underneath, especially along the very prominent projecting midrib and veins, of a dirty grey or fawn color on the older leaves, the margins revolute, denticulate with thick callous teeth; flowers not seen, a single dead terminal flower stalk was seen on one of the plants, which was about 1 m. long.

OAHU: at the very top of the main crest of the island, overlooking the cliffs of Waimanalo at an elevation approaching 3,000 feet, September 14, 1917, *J. F. Rock 12836*, TYPE, in the herbarium of the College of Hawaii. Several plants were seen growing together, the lower ones of which could not be reached owing to the vertical cliffs on which they grew, immediately below the knife-edge crest of the backbone of the island of Oahu. The plant forms a large

rosette with the leaves densely packed at the apex in an almost horizontal position, that is, at right angles to the stem. It grows in company with *Trematolobelia macrostachys* (Hook. & Arn.), Zahlbr., *Dubautia laxa* Hook. & Arn., *Metrosideros rugosa* Gray, and other species. Notwithstanding that the flowers of this new species are unknown, the plant is so distinct from all of our other lobelias that it can well be described at present.

The plant is evidently related to *Lobelia hypoleuca* Hillbrd., from which it differs in the solid stem, thick, coriaceous, closely reticulate leaves, not silvery underneath but hirsute, being covered with fawn-colored or dirty gray hair. In *Lobelia hypoleuca*, which is a branching species, the leaves are few and more or less scattered, thin and chartaceous; it does not ascend to such high elevations, but remains more at the lower levels, from 1,000 to 1,500 feet, in very sheltered situations, especially deep ravines.

5. **Straussia glomerata** sp. nov.

A medium-sized tree, 10 m. or more in height, trunk straight, crown round and of rather small dimension; stipules cup-shaped, not triangular, sheathing and of even height, 3 mm. high, soon deciduous; leaves obovate, coriaceous, glossy and smooth above, dull and pubescent beneath, especially along the midrib and veins, pubescent glands present in the axils of veins and midrib, 5–10 cm. long, 4.5–6.5 cm. wide, on petioles 15 mm. long, rounded at the apex, cuneate at the base; panicle erect, not drooping save when in full fruit, 2–4 cm. long, distinctly angular, hirsute with dirty yellowish hair, whorls two or three, of very short rays 2–6 mm. long; flowers sessile; calyx minute, 0.5–0.75 mm. long, densely hirsute, truncate; corolla greenish white, minute, tube 0.5 mm. long, lobes 1.5 mm. long, glabrous, stamens minute, filaments 0.25 mm. long; the convex disk densely hirsute; fruits numerous, densely agglomerate, forming a densely packed globose head, hiding all whorls and rays, fruits yellow, pubescent to hirsute, obovate, 9 mm. long, 6–6.5 mm. wide, crowned by a rounded, dome-shaped, projecting disk.

HAWAII: North Kona, in the forest of Waihou and on the lava flows of Puuwaawaa, at an elevation of 3,700 feet, August 24, 1917, *J. F. Rock 12829* (flowering and fruiting specimens), TYPE, in the herbarium of the College of Hawaii.

This interesting species is very distinct from the other species

in the genus, and is remarkable for the minute flowers, hirsute panicles and fruits which are densely glomerate, forming a densely packed, globose head, nearly as long as broad. It is related to *Straussia hawaiiensis* which differs however in the loose and open-whorled drooping, glabrous panicle.

COLLEGE OF HAWAII,
HONOLULU, TERRITORY OF HAWAII

Explanation of plate 6

Cyanea Giffardii Rock. Photograph of the type specimen, showing the crown of a flowering tree, twenty-four feet in height.

New species of Uredineae—X *

JOSEPH CHARLES ARTHUR

The preceding number in this series† was issued in November, 1915. Since that time some collections of Uredinales have come to hand, or have been awaiting study, which appear to be undescribed. The discovery of additional spore forms for previously named species admits of their transfer to more suitable genera, thus necessitating new combinations. Both new names and new combinations are required in order to make the material more available in future studies. All the species are North American. Although the localities range from Wyoming and Vermont to Panama and the West Indies, yet the majority are in Mexico and Central America, where the rust flora is abundant, but much less known than northward.

Uromyces Atriplicis (Shear) comb. nov.

Aecidium Atriplicis Shear, Bull. Torrey Club **29**: 453. 1902.

The aecia of this rust have been known for a number of years. They are abundant in Colorado on *Atriplex confertifolia* (Torr.) S. Wats., and were distributed in Griffiths, West Amer. Fungi *321* (type), Ellis & Ev., Fungi Columb. *1294*, and Barth., North Amer. Ured. *401*. On August 29, 1911, telia were gathered by Mr. E. Bethel at Delta, Colorado, from the same plants that had yielded a large crop of aecia earlier in the season. This collection shows the same plentiful sprinkling of telia over the under side of the leaves as marks the presence of the aecia, a few sori in both cases usually appearing on the upper side of the leaves. The collection from Delta also includes aecia, both on the same leaves

* Reprints may be obtained by application to the Botanical Department, Purdue University Agricultural Experiment Station, Lafayette, Ind., under whose auspices the work was carried on.

† New Species of Uredineae I–IX: Bull. Torrey Club (I) **28**: 661–666. 1901. (II) **29**: 227–231. 1902; (III) **32**: 1–8. 1904; (IV) **33**: 27–32. 1906; (V) **33**: 513–522. 1906; (VI) **34**: 583–592. 1907; (VII) **37**: 569–580. 1910 (VIII) **38**: 369–378; 1911; (IX) **42**: 585–593. 1915

with the telia, and intermixed with them, and also separately. The telia were also found at Pueblo, Colorado, by Mr. Bethel, and on September 13, 1911, Dr. F. D. Kern and the writer, following Mr. Bethel's directions, visited the spot, but were only rewarded with aecia. On August 13, 1912, Dr. Kern repeated the visit and found plenty of telia. Both the position of the telia on the leaves, and their succession to the aecia on the same plants, indicate their genetic relationship. The telia may be described as follows:

III. Telia chiefly hypophyllous, scattered, round or irregular, 0.2–0.4 mm. across, early naked, pulverulent, cinnamon-brown, ruptured epidermis noticeable; teliospores broadly ellipsoid or ovoid, 18–23 by 23–30 μ, rounded at both ends, or somewhat narrowed below; wall cinnamon-brown, 1.5–2 μ thick, 4–5 μ above, including a low semi-hyaline umbo, smooth; pedicel colorless, fragile.

The type collection, made by Shear & Bessey at Montrose, Colorado, July, 1897, showing only aecia, was distributed as on *Atriplex Nuttallii*, an error for *A. confertifolia*.

Uromyces fuscatus sp. nov.

I. Aecia amphigenous, in dense groups 3–5 mm. across; peridia short-cylindric, the margin erect, coarsely and deeply lacerate; peridial cells rhomboidal, 13–19 by 28–37 μ, considerably overlapping, the outer wall 7–9 μ thick, finely striate transversely, the inner wall 2.5–3.5 μ thick, moderately verrucose; aeciospores globoid, 16–22 μ in diameter; wall colorless, 1–1.5 μ thick, finely and closely verrucose, often appearing smooth when wet.

II. Uredinia amphigenous, scattered, round, 0.3–0.8 mm. across, elevated, early naked, puberulent, dark cinnamon-brown, ruptured epidermis conspicuous; urediniospores globoid or broadly ellipsoid, 18–24 by 22–29 μ; wall cinnamon-brown, 2–3 μ thick, closely and finely verrucose, the pores 3 or 4, approximately equatorial.

III. Telia amphigenous, scattered, round or irregular, 0.5–2 mm. across, often confluent, early naked, prominent, dark chestnut-brown, ruptured epidermis evident; teliospores broadly ellipsoid or globoid, 18–23 by 23–28 μ, rounded at both ends; wall chestnut-brown, 2–2.5 μ thick, slightly thicker above, 3–5 μ, moderately verrucose in longitudinal lines; pedicel colorless, as long as spore, but fragile and usually broken off short.

On *Polygonum alpinum* All., House Creek, Idaho, June 29,

1912, *Nelson & Macbride 1794* (type); near Gogorza, Summit County, Utah, June 29, 1915, *A. O. Garrett 2286*. Among autoecious species this appears to be most like *Uromyces Acetosae* Schröt., a European species on *Rumex*, but the urediniospores are verrucose and not echinulate and have a different number of pores, while the teliospores are contrasted in the coarseness and arrangement of the markings. There appears to be no correlated form among the many species of *Puccinia* on either *Polygonum* or *Rumex*. The rust covers the leaves heavily with the conspicuous sori, inducing a more or less mottled, reddish appearance of the tissues. The specimen from Utah was labelled *Pentstemon procerus*, but both host and rust appear identical with the one from Idaho.

Uromyces Krameriae Long, sp. nov.

III. Telia amphigenous and caulicolous, soon opening by a longitudinal slit, chestnut-brown, loosely and prominently pulvinate, oblong, 0.1–2 mm. long, ruptured epidermis conspicuous; teliospores broadly ellipsoid or globoid, 21–23 by 23–29 μ; wall cinnamon-brown, 2.5–3 μ thick, thicker above, 6–9 μ, including a broad paler umbo, smooth; pedicel hyaline, once to twice or more the length of the spore.

On *Krameria glandulosa* Rose & Painter, Denton, Texas, October 21, 1901, *W. H. Long 1071*. The host has usually passed under the name of *K. parvifolia*, a species of Lower California. This rust was received a long time since with the name as given above. I do not find that the species has yet had the name established, and so take this opportunity to place it in use. It is one of the numerous finds made by Mr. W. H. Long, while living in northern Texas, and affords one more evidence of Mr. Long's extended and efficient study of the rusts. No urediniospores were detected, but the appearance of the rust is not that of a short-cycle form; it is more likely to possess cupulate aecia. Only the one collection is known.

Puccinia wyomensis sp. nov.

O and I. Pycnia and aecia unknown.

II. Uredinia chiefly hypophyllous, scattered, oblong to linear, 0.6–2 mm. in length, 0.2–0.4 mm. wide, tardily naked, finally opening by a longitudinal slit, pulverulent, golden-brown, rup-

tured epidermis conspicuous; urediniospores broadly ellipsoid or obovoid, 18–21 by 26–29 μ; wall pale yellow or quite colorless, 1–1.5 μ thick, closely and rather inconspicuously echinulate, the pores 6–8, scattered.

III. Telia amphigenous, scattered, oblong to linear, 0.2–3 mm. in length, compact, dark gray, long covered by the epidermis, surrounded by a thin dark-brown stroma; teliospores oblong or clavate, 15–21 by 50–60 μ, truncate or somewhat rounded above, narrowed below, slightly or not constricted at septum; wall cinnamon-brown, darker above, thin, 1–1.5 μ, not or slightly thickened above, 2–5 μ, smooth; pedicel very short, tinted.

On *Scirpus americanus* Pers., Arcola, Wyoming, August 23, 1916, *E. Bartholomew 6089*. A subepidermal form of *Scirpus* rust abundantly distinct from all others.

Puccinia Rosenii sp. nov.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered or in series, oval or linear, 0.5–2 mm. long, rather tardily naked, ruptured epidermis conspicuous; urediniospores 30–35 μ long, when seen with pores in optical section oblong, 10–20 μ wide, when seen with pores central globoid or broadly ellipsoid, 28–35 μ wide; wall cinnamon-brown, 1.5–2.5 μ thick, moderately echinulate, the pores 2, superequatorial.

III. Telia few, disposed like the uredinia, tardily naked, chocolate-brown; teliospores clavate, or elongated oblong, 16–23 by 43–67 μ, rounded or truncate above, usually narrowed below, slightly constricted at septum; wall chestnut-brown above, somewhat lighter below, 1–2 μ thick, 5–10 μ above, smooth; pedicel colorless, nearly as long as spore.

On *Schoenus nigricans* L. (?), Daytona, Florida, December 27, 1915, *R. A. Harper 5*. This rust, found in scanty amount on a somewhat uncertain host without inflorescence, is apparently nearest like *P. Eriophori* Thüm. This species is named for H. R. Rosen, who has made the careful study of this material on which the diagnosis and conclusions are founded.

Puccinia Heliconiae (Diet.) comb. nov.

Uredo Heliconiae Diet. Hedwigia **36**: 35. 1897.

The uredinial stage of this rust was described from a collection made at Rio de Janeiro, Brazil, in December, 1891, on an unde-

termined species of *Heliconia* (*Bihai*). In North America it was collected in Martinique, West Indies, on *Bihai borinquena* Griggs, August, 1913, and again by Whetzel and Olive in Porto Rico, West Indies, on the same host, April, 1916, both collections showing only uredinia. In a collection on *Bihai latispatha* (Benth.) Griggs, made by E. Bethel, at Montelinio, Canal Zone, Panama, March 4, 1913, an abundance of telia accompany the uredinia. The characters of the telia are as follows:

III. Telia hypophyllous, scattered, soon naked, round, 0.3–0.5 mm. across, cinnamon-brown, ruptured epidermis evident; teliospores elongated clavate, 15–19 by 60–72 μ, rounded above, not or slightly constricted at septum; wall pale cinnamon-brown, thin, 1 μ, much thickened above, 9–13 μ, smooth, pedicel short, colorless.

The urediniospores of this species appear to be quite variable. Those of the West Indian collections are thin and dark, as compared with most of those of the Panama collection, in which, however, all gradations occur. The sori of the present material are much parasitized, and both uredinia and telia are consequently unnaturally conspicuous.

Puccinia Viornae sp. nov.

O. Pycnia epiphyllous, crowded upon swollen areas 2.5–5 mm. in diameter, dark brown, noticeable, subepidermal, globoid, 98–110 μ in diameter, with ostiolar filaments.

I. Aecia hypophyllous, crowded upon swollen areas opposite the pycnia, cupulate, short, 0.2–0.5 mm. in diameter; peridium recurved, the peridial cells rectangular, abutted, 19–23 by 22–24 μ, the outer wall 7–9 μ thick, the inner wall 3–5 μ thick, finely verrucose; aeciospores irregularly globoid or ellipsoid, 13–16 by 14–18 μ; wall colorless, thin, 1.5 μ, finely and closely verrucose.

II. Urediniospores in the telia, ellipsoid or elliptic-obovoid, 16–19 by 24–32 μ; wall pale golden-brown, thin, 1–1.5 μ, thicker above, 3–5 μ, closely echinulate, the pores indistinct, 2 or possibly more, equatorial; paraphyses in the telia, intermixed with the spores, or surrounding groups of spores, cylindric, clavate or clavate-capitate, 7–23 by 47–64 μ, the wall nearly colorless to golden-brown, darker above, thin, 1–1.5 μ, somewhat thickened above, 2–7 μ.

III. Telia caulicolous, scattered, oblong or linear, 1–3.5 mm. long, somewhat tardily naked, inclined to be pulverulent, chestnut-brown, ruptured epidermis conspicuous; paraphyses sparingly

intermixed, doubtless of uredinial origin, often wanting; teliospores apparently in groups, ellipsoid or oblong, 16–21 by 28–35 μ, rounded at both ends, deeply constricted at the septum; wall dark chestnut-brown, uniformly 1.5–2 μ thick, moderately and closely verrucose with conical warts, at times almost echinulate; pedicel short, colorless, fragile.

On *Viorna* sp., Abilene, Texas, May 17, 1900, *T. A. Williams*. The specimen, which was communicated by the National Museum, Washington, D. C., has been in hand for a considerable time, hoping that additional material would come to light. The appearance of the rust is much like that of species belonging to the genus *Tranzschelia*, but the uredinial stage is yet imperfectly known; moreover, the pycnia are unequivocally subepidermal. It finds its nearest representative seemingly in *Tranzschelia cohaesa* (Long) Arth. (*Puccinia cohaesa* Long), a species from Texas on *Anemone*. But not only are the pycnia subepidermal, both pycnia and aecia are grouped instead of systematically scattered. It might be assumed that the aecia here described, which occur upon the leaves and are entirely dissociated from the caulicular telia, do not belong to this species, but are heteroecious and the aecia of *Puccinia Agropyri* E. & E., which occur upon species of *Viorna* further north, and are common in Texas on *Clematis Drummondii*. However, the aeciospores measure much smaller than those of any collection known for that species. An interesting feature is the grouping of the teliospores, which can be fairly well seen in sections of sori, which have not yet opened. It is a character exactly in accord with the telial characters selected for the genus *Tranzschelia*. The paraphyses are also essentially like those of that genus, both in form and position in the sorus, and the uredinio-spores as well. The characters of the latter can not, however, be fully made out until the uredinial sorus is studied. Altogether it would seem that in this new and highly distinctive ranunculaceous species of rust we have another candidate for the genus *Tranzschelia*, and one which will necessitate some modification in the generic characters.

Puccinia missouriensis sp. nov.

O. Pycnia epiphyllous, few in small groups, honey-yellow, inconspicuous, subepidermal, flask-shaped, 60–75 μ in transverse diameter, with ostiolar filaments.

I. Aecia hypophyllous, usually few in somewhat indefinite groups opposite the pycnia, cylindric, 0.3–0.5 mm. long, 0.1–0.2 mm. in diameter; peridium erect, erose; peridial cells rhombic or rectangular, abutted or somewhat overlapping, 15–23 by 18–27 μ, the outer wall thick, 10–15 μ, transversely striate, smooth, the inner wall much thinner, 2–3 μ, coarsely verrucose; aeciospores globoid or ellipsoid, 13–16 by 16–20 μ; wall colorless, thin, 1–1.5 μ, finely and closely verrucose.

III. Telia hypophyllous, scattered among the groups of aecia, round, early naked, pulvinate, chestnut-brown, ruptured epidermis inconspicuous; teliospores oblong, 10–14 by 40–48 μ, obtuse or rounded at both ends, slightly constricted at septum; wall dark cinnamon-brown, 1.5–2 μ thick, much thicker above, 5–9 μ, smooth; pedicel short, more or less tinted.

On *Ranunculus recurvatus* Poir., Creve Coeur Lake, Missouri, May, 1887, *L. H. Pammel*. The collection came to the writer's attention ten years ago, when consulting the cryptogamic herbarium of the New York Botanical Garden. It was there labelled *Aecidium ranunculacearum*, and was for a long time considered one of the common heteroecious aecia belonging to grass rusts. When critically examined, however, it was found that the abundant aecia differed somewhat from those belonging to grasses, and were accompanied by telia, which had before been overlooked. It is remarkable that no other similar collection has turned up in the thirty years since it was gathered.

Puccinia obesispora sp. nov.

II. Uredinia chiefly hypophyllous, confluent on discolored spots, often in rings about a central area that becomes dry and dead, or scattered, early naked, cinnamon-brown, ruptured epidermis prominent; urediniospores broadly ellipsoid or globoid, 19–26 by 24–30 μ; wall variable in thickness, 1.5–3 μ, dark cinnamon-brown, sparsely and strongly echinulate, the pores 2, equatorial.

III. Telia chiefly hypophyllous, scattered, usually following the uredinia, irregular in outline, 0.1–0.5 mm. across, early naked, dark chocolate-brown; teliospores ellipsoid or oblong, large, 26–35 by 55–70 μ, rounded at both ends, or obtuse or even acute above, slightly or not constricted at septum; wall chocolate-brown, thick, 3–4 μ, much thicker above, 6–12 μ, coarsely and rather sparsely verrucose; pedicel tinted near the spore, and twice length of spore, or less.

On *Achyranthes obovata* (Mart. & Gal.) Standley, Oaxaca, Mexico, October 24, 1899, *E. W. D. Holway 3732*. The species is remarkable for its large, coarsely verrucose teliospores, which greatly resemble those of the euphorbiaceous species, *P. Euphorbiae* P. Henn. In that species the uredinia are sometimes accompanied by pycnia. In the present species the annular groups of uredinia appear like a primary stage, but no pycnia could be found by sectioning or otherwise.

Puccinia incondita sp. nov.

III. Telia hypophyllous and caulicolous, densely pressed or confluent into more or less rounded pulvinate masses, 1–3 mm. across, dark cinnamon-brown, early naked, ruptured epidermis inconspicuous; teliospores irregularly ellipsoid or oblong, 16–20 by 23–29 μ, rounded at both ends or somewhat narrowed below, slightly or not constricted at septum; wall cinnamon-brown, 1.5–2.5 μ thick, not or somewhat thicker above up to 6 μ, smooth; pedicel colorless, sometimes longer than spore, usually breaking near the spore.

On *Solanum triquetrum* Cav., Austin, Texas, January 5, 1916, *B. C. Tharp*. A short-cycle rust which appears to be different from any species on *Solanum* heretofore described.

Puccinia adducta sp. nov.

O. Pycnia epiphyllous, in small orbicular groups, dark brown, noticeable, subepidermal, globoid, 80–105 μ broad.

II. Uredinia hypophyllous, at first grouped opposite the pycnia on larger yellowish spots 2–5 mm. across, afterward scattered, small, round, rather tardily naked, cinnamon-brown, surrounding epidermis noticeable; urediniospores broadly obovoid, 19–23 by 27–35 μ; wall pale cinnamon-brown, 1–2 μ thick, moderately and strongly echinulate, the pores indistinct, possibly 3 and equatorial.

III. Telia hypophyllous, following the uredinia in the same sori; teliospores ellipsoid or oblong, 19–26 by 35–40 μ, obtuse or rounded at both ends, slightly or not constricted at septum, wall cinnamon-brown, 1–2 μ thick, usually with a slight papilla-like thickening at apex, smooth; pedicel short, rather thick, often deciduous.

On *Solanum racemosum* Jacq., Antigua, West Indies, February 4–16, 1913, *Rose, Fitch & Russell 3473*. A seemingly distinctive species.

Puccinia Notopterae sp. nov.

O. Pycnia amphigenous, crowded on brownish areas 2–3 mm. across, dark brown, conspicuous, subepidermal, globoid, 85–140 μ in diameter, with ostiolar filaments.

III. Telia epiphyllous, becoming amphigenous, circinating about the pycnia at first, then becoming confluent and causing hypertrophy, early naked, very pulverulent, chestnut-brown, ruptured epidermis noticeable; teliospores ellipsoid, 19–24 by 26–34 μ, rounded at both ends, slightly constricted at septum; wall dark cinnamon-brown, evenly 1.5 μ thick; coarsely and rather sparingly verrucose; pedicel colorless, short, fragile.

On *Notoptera hirsuta* (Sw.) Urban, Mandeville, Jamaica, February 23, 1915, *E. W. D. Holway 226*. A distinctive, short-cycle rust, on a host genus not before represented among those bearing rusts.

Aecidium anthericicola sp. nov.

O. Pycnia amphigenous, in small orbicular groups, small, honey-yellow, inconspicuous, subepidermal.

I. Aecia hypophyllous, in annular groups 2–7 mm. across about the pycnia, at first bullate then erect, the margin erose; peridial cells quadrate, 16–20 by 20–26 μ, abutted, the outer wall slightly or no thicker than the inner wall, 3–6 μ; aeciospores globoid, 16–20 by 19–23 μ; wall colorless, thin, 1.5 μ, very finely verrucose, appearing smooth when wet.

On *Anthericum nanum* Baker, Dedregal near Tlalpam, Valley of Mexico, Mexico, June 30, 1905, *Rose, Painter & Rose 8246*. The species is similar to the aecia of *Uromyces Hordei* on *Nothoscordium*, but both the peridial cells and aeciospores are smaller than in that form.

Aecidium plenum sp. nov.

O. Pycnia amphigenous, crowded in groups 0.2–0.3 mm. across, cinnamon-brown, small, inconspicuous, subepidermal.

I. Aecia hypophyllous, crowded in circular groups about the pycnia, 1–2 mm. across, without conspicuous spots, cupulate or short cylindric; peridium erect, or somewhat recurved, irregularly and deeply lacerate; peridial cells angularly oblong in face view, about 20 by 30 μ, narrowly oblong in radial section, somewhat overlapping, about 8–10 by 30 μ, the outer wall 5–9 μ thick, smooth, the inner wall 3–6 μ, coarsely verrucose; aeciospores globoid or ellipsoid, 16–21 by 18–24 μ; wall colorless, thin, 1 μ, finely and closely verrucose.

On *Argemone intermedia* Sweet, Burkburnett, Texas, May 29, 1917, *B. O. Dodge*. The collection shows a remarkably heavy infection, the leaves being wholly covered with groups of aecia on the lower side, with scarcely an aecium showing above. The groups rarely become confluent and indistinguishable, although often somewhat intermingling. The general appearance of the rust is that of a heteroecious form, and is not unlike that on *Agoseris*, *Lactuca* and *Crepis*, belonging to the *Carex* species, *Puccinia patruelis*. No aecia have heretofore been reported on any papaveraceous host, and no safe prediction can be made regarding its relationship.

Aecidium Thenardiae sp. nov.

I. Aecia hypophyllous, in circular groups 8–10 mm. across, often circinating, on somewhat larger, yellowish spots, short cylindric; peridium white, the margin erect, erose, or torn; peridial cells in face view oblong, 16–22 by 24–30 μ, somewhat overlapping, moderately verrucose; aeciospores quadrately globoid, 14–16 μ in diameter; wall colorless, thin, 1–1.5 μ in diameter, somewhat thicker above, 2–5 μ, finely and closely verrucose.

On *Thenardia Galeottiana* Baill., near Oaxaca, Mexico, August 20, 1894, *C. G. Pringle*, communicated by E. W. D. Holway. The form is undoubtedly heteroecious.

Aecidium Cyrillae sp. nov.

I. Aecia hypophyllous, in groups of 2–8, rarely more, on reddish-brown spots, 2–4 mm. across, short-cylindric, white; peridium erect, erose; peridial cells quadrangular in radial section, with a strongly overlapping projection, the outer wall 5 μ thick, smooth, the inner wall 7–9 μ thick, verrucose; aeciospores irregularly ellipsoid or globoid, 19–23 by 23–26 μ; wall colorless, thin, 1–1.5 μ, greatly thickened above, 7–9 μ, closely and finely verrucose.

On *Cyrilla racemiflora* L., Ocean Springs, Mississippi, June 15, 1896, *Underwood & Earle*. A sparse amount of the rust was found on the same host in the phanerogamic herbarium of the New York Botanical Garden, collected at New Orleans, Louisiana, 1832, *Drummond 202*. A well-marked species, which is probably heteroecious.

Aecidium Tithymali sp. nov.

O. Pycnia hypophyllous, scattered sparsely over the surface of the leaf, preceding and accompanying the aecia, punctiform, honey-yellow or brownish, noticeable, subepidermal, globoid or flask-shaped, 110–150 μ broad; ostiolar filaments 60–100 μ long.

I. Aecia hypophyllous, evenly and loosely scattered, at first bullate and opening by a pore or irregular break of the epidermis; peridia erect or recurved, torn, fragile; peridial cells rhomboidal, 10–15 by 23–27 μ, somewhat overlapping, the outer wall 5–7 μ thick, striate, the inner wall 2–3 μ thick, verrucose; aeciospores globoid or broadly ellipsoid, 18–22 by 19–24 μ; wall nearly or quite colorless, thin, 1–1.5 μ, finely verrucose.

On *Tithymalus commutata* (Engelm.) Kl. & Garcke (*Euphorbia commutata* Engelm.), Decorah, Iowa, June, 1883, *E. W. D. Holway;* same, June 20, 1885, *E. W. D. Holway* (Barth. N. Am. Ured. *703*); Beloit, Wisconsin, May 30, 1910, *J. J. Davis;* Lafayette, Indiana, June 7, 1901, *H. B. Dorner* (type); same, May 13, 1910, *Kern & Billings;* Plummer Island, Maryland, May 30, 1903, *P. L. Ricker 1055;* Crawfordsville, Indiana, May 17, 1913, *F. D. Kern.*

On *Tithymalus leiococcus* (Engelm.) Small (*Euphorbia texana* Boiss.), San Antonio, Texas, March 16, 1900, *Wm. Trelease;* same, February 16, 1914, *Arthur & Fromme 5300.*

On *Tithymalus missouriensis* (Norton) Small (*Euphorbia dictyosperma* Auct.), Lincoln, Nebraska, April 28, 1902, *Geo. G. Hedgcock.*

On *Tithymalus robusta* (Engelm.) Small (*Euphorbia robusta* Small), Colorado, July, 1888, *C. H. Demetrio* (Ellis & Ev. N. Am. Fungi *2215*); Flagstaff, Arizona, June, 1891, *D. T. MacDougal;* Larimer County, Colorado, July 2, 1894, *C. F. Baker 261;* Colorado Springs, Colorado, August 2, 1900, *E. T. Harper 368;* Wasatch County, Utah, August 3, 1905, *A. O. Garrett* (Fungi Utah. *96*); La Veta, Colorado, 2,100 m. alt., June 21, 1907, *F. E. & E. S. Clements* (Crypt. Form. Colo., *594*); Boulder, Colorado, May 13, 1910, *E. Bethel;* same, August 23, 1911, *Bethel, Arthur & Kern 509;* Denver, Colorado, May 24 and June 2, 1915, *E. Bethel;* Ft. Collins, Colorado, May 23, 1916, *J. C. Arthur;* Golden, Colorado, May 27, 1916, *J. C. Arthur;* Rimrock Station, Montana, August 2, 1917, *E. Bartholomew 6213.*

This is a common and conspicuous species in the Rocky Mountains, and extends sparingly eastward across the plains and over the Allegheny Mountains. For a long time it has been considered heteroecious and probably the early stage of the common *Uromyces* on *Astragalus*. Both its distribution and morphological characters favored this view, and many attempts at cultures were undertaken to substantiate the assumed connection but without success. Observations in the field have yielded no strong evidence that the aecia were followed by telia on *Astragalus*, but rather that they were not. At various times it has been suggested that the telial form on the same hosts as the aecia, *Uromyces Tranzschelii*, an apparently short-cycle species having pycnia associated with the telia, might be derived at times from the aecia, and all be one autoecious species. If this were true, we should have the anomalous condition of a short-cycle and a long-cycle form associated at times so intimately that only culture demonstration could separate them. In the meantime while actual experimental knowledge is awaited, it seems best to designate the aecia by a name that will distinguish them from other aecia on similar hosts. Some of the collections above cited are said to be on *Euphorbia montana*, which may be true, although the preponderance of probability points to *E. robusta*, a far more common species in the region covered, and under this name they have been listed.

Aecidium Mozinnae sp. nov.

O. Pycnia chiefly epiphyllous, few in orbicular groups, honey-yellow, inconspicuous, subepidermal, globoid, 90–125 μ across; ostiolar filaments present, abundant.

I. Aecia hypophyllous, encircling the pycnial area, on yellowish spots 2–5 mm. across; peridium cylindric, the margin erect and erose; peridial cells quadrate or rectangular, 19–24 by 29–34 μ, abutted or slightly overlapping, the outer wall 10–12 μ thick, transversely striate, smooth, the inner wall 3–5 μ thick, strongly verrucose; aeciospores angularly ellipsoid or globoid, 19–23 by 24–29 μ; wall nearly or quite colorless, 2–2.5 μ thick, closely and noticeably verrucose.

On *Mozinna spathulata* (Müll.-Arg.) Ortega (*Jatropha spathulata* Müll.-Arg.), State of Guanajuato, Mexico, July 11, 1899, *J. N. Rose & Walter Hough 8999*.

The species appears to be well defined, and is quite likely heteroecious.

Aecidium conspicuum sp. nov.

O. Pycnia amphigenous, numerous, crowded in round groups, 0.3–1 mm. across, small, honey-yellow, subepidermal, flask-shaped, 100–125 μ in transverse diameter.

I. Aecia amphigenous, in large, dense groups 3–8 mm. across, on slightly larger discolored spots; peridium erect or somewhat recurved, finely lacerate; peridial cells angularly oval in face view, 26 by 32–38 μ, oblong in radial section, 16 by 32–38 μ, strongly overlapping, the inner wall 10–12 μ thick, verrucose, the inner wall about 1 μ, smooth; aeciospores globoid, 19–23 μ in diameter; wall colorless, thin, 1 μ, finely verrucose.

On *Dugaldea Hoopesii* (A. Gray) Greene (*Helenium Hoopesii* A. Gray), La Plata River, Colorado, 9,500 ft. alt., July 16, 1898, *Baker, Earle & Tracy 1075;* mountains near Pagosa Peak, Colorado, 9,000 ft. alt., August 10, 1899, *C. F. Baker 113;* Cloudcroft, New Mexico, July 19, 1899, *E. O. Wooton;* Winsor Creek, Pecos National Forest, New Mexico, July 28, 1908, *Paul C. Standley 4581;* Rio Pueblo, New Mexico, August 11, 1910, *E. O. Wooton;* Little Colorado River, White Mts., Arizona, July 20, 1910, *L. N. Goodding;* Trout Lake, Colorado, 10,000 ft. alt., August 2, 1912, *Arthur & Kern 5108;* Snowball Creek near Pagosa Springs, Colorado, 7,200 ft. alt., August 6, 1912, *Arthur & Kern 5521* (type); Ute Park, Colfax County, New Mexico, August 25, 1916, *Paul C. Standley 13756.*

This rust is quite common in the Rocky Mountains from 7,000 to 10,000 feet altitude. The plants grow from two to three feet tall, and the long lanceolate leaves are often conspicuously yellowed by the abundant aecia, which show strongly against the cinereous surface of the host. It is undoubtedly a heteroecious species. In 1912 Dr. F. D. Kern and the writer searched the two localities where the rust was found by them for a possible alternate form, but in vain. Similar efforts have been made by Mr. E. Bethel, but with no better success.

Aecidium Pereziae sp. nov.

O. Pycnia chiefly epiphyllous, closely grouped, honey-yellow becoming brown, punctiform, noticeable, subepidermal.

I. Aecia hypophyllous, numerous, opposite the pycnia, in well-defined groups 0.3–0.6 mm. across, on roseate or yellowish spots 10–15 mm. across, cupulate; peridium usually erect, the margin erose or lacerate; peridial cells easily separating, rhomboid, little or no longer than broad, 19–26 by 26–37 μ, the outer wall 8–10 μ thick, faintly striate, the inner wall 3–6 μ thick, moderately verrucose; aeciospores globoid, 13–18 by 16–19 μ; wall nearly or quite colorless, thin, 1–1.5 μ, very minutely verrucose, appearing smooth when wet.

On *Perezia* sp., Barranca, Mexico, July 25, 1893, *C. G. Pringle*, communicated by W. G. Farlow. A distinctive species, and doubtless heteroecious.

Aecidium steviicola sp. nov.

O. Pycnia amphigenous, numerous, in loose groups, punctate, honey-yellow becoming brown, noticeable, subepidermal.

I. Aecia hypophyllous, in loose groups surrounding the pycnia on yellowish spots 10–15 mm. across, cupulate, the margin somewhat reverted, erose or lacerate; aeciospores globoid, large, 24–32 by 30–40 μ; wall colorless, rather thin, about 1.5 μ, considerably thickened above, 6–9 μ, minutely and closely verrucose.

On *Stevia* sp., Popo Park, Federal District of Mexico, August 4–8, 1910, *A. S. Hitchcock*.

This is doubtless a heteroecious form. It much resembles *A. roseum* Diet. & Holw., which occurs in Mexico on species of *Stevia*, but more abundantly on *Eupatorium*, and which is believed to be the aecial stage of a grass rust, probably *Aegopogon*, but the spores are nearly half as much longer than in that form, although in other respects there is close similarity.

Aecidium Keerliae sp. nov.

O. Pycnia amphigenous, in close groups 1–2 mm. across, honey-yellow becoming brown, punctiform, noticeable, subepidermal.

I. Aecia hypophyllous, in groups 3–8 mm. across, on somewhat larger, yellowish spots, cupulate, low; peridium slightly recurved, erose or lacerate; aeciospores globoid or ellipsoid, small, 12–18 by 15–20 μ; wall nearly or quite colorless, thin, 1 μ, much thicker above, 3–6 μ, finely and closely verrucose.

On *Keerlia mexicana* A. Gray, Guadalajara, Mexico, July 14,

1893, *C. G. Pringle*, communicated by W. G. Farlow. A species of the general characteristics of *A. roseum* and *A. steviicola*, both of which are also on carduaceous hosts, but with very much smaller spores. It is likely to prove to be heteroecious.

Uredo egenula sp. nov.

II. Uredinia epiphyllous, scattered, oblong or linear, 0.1–1.2 mm. long, early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; urediniospores globoid to broadly ellipsoid, 21–25 by 26–34 μ; wall cinnamon-brown, 1.5–2.5 μ thick, moderately echinulate, the pores 2, equatorial, prominent.

On *Sporobolus argutus* (Nees) Kunth, alkali soil below Gregory Park, Healthshire Hills, Halfmoon Bay, Jamaica, West Indies. The specimen was removed from a phanerogamic collection in the National Herbarium, made October 31, 1912, by *A. S. Hitchcock 9760*, and communicated by Mrs. Agnes Chase. The form is one that seems to fit no recorded species on *Sporobolus*. It is named and described in order to call attention to the need of search for the telial stage, and of observations that may eventually lead to finding the aecia.

Uredo panamensis sp. nov.

II. Uredinia hypophyllous, crowded in circinating groups 2–3 mm. across on slightly discolored spots of nearly the same size, round or oblong, 0.3–0.5 mm. in diameter, the central one usually much larger, subepidermal, early naked, applanate, cinnamon-brown, ruptured epidermis evident; urediniospores globoid or broadly ellipsoid, 20–27 by 24–31 μ; wall cinnamon-brown, rather thick, 2–3 μ, very closely echinulate, often appearing verrucose, the pores distinct, 3, approximately equatorial.

On *Phytolacca decandra* L., Panama, December 7, 1915, *E. W. D. Holway 234*. The sorus is without special inclosing structures, and resembles the form common for the genera *Puccinia* and *Uromyces*. The species is quite unlike *Puccinia Rivinae* (B. & C.) Speg., the only other rust known on this family of hosts.

Uredo unilateralis sp. nov.

II. Uredinia hypophyllous, in groups 2–4 mm. across, more or less circinate, or scattered, round, 0.2–0.8 mm. in diameter, soon

naked, cinnamon-brown, somewhat pulverulent, ruptured epidermis evident; urediniospores broadly obovate, or spatulate-obovate, flattened or concave on one side, 20–26 by 26–32 μ; wall cinnamon-brown, uniformly thick, 1.5–2 μ, sparsely and noticeably echinulate except on concave side which is smooth, with one pore on concave side, subequatorial, sometimes near hilum.

On *Geranium mexicanum* H.B.K., Amecameca, Mexico, October 6, 1900, *E. W. D. Holway*. A unique form on account of the spore having a smooth, concave side, bearing the single pore.

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A striking variation in Silene noctiflora

E. P. Humbert

(with two text figures)

From some *Silene noctiflora* seeds planted in the greenhouse December 1, 1917, one very interesting plant has developed. The normal *Silene noctiflora* seedling has two seed-leaves and succeeding leaves are in whorls of two, or opposite, each pair being placed over the intervals between the preceding pair. The pairs cross at right angles or decussate. This is illustrated in Fig. 1, a reproduction of a normal seedling. The plant which is the

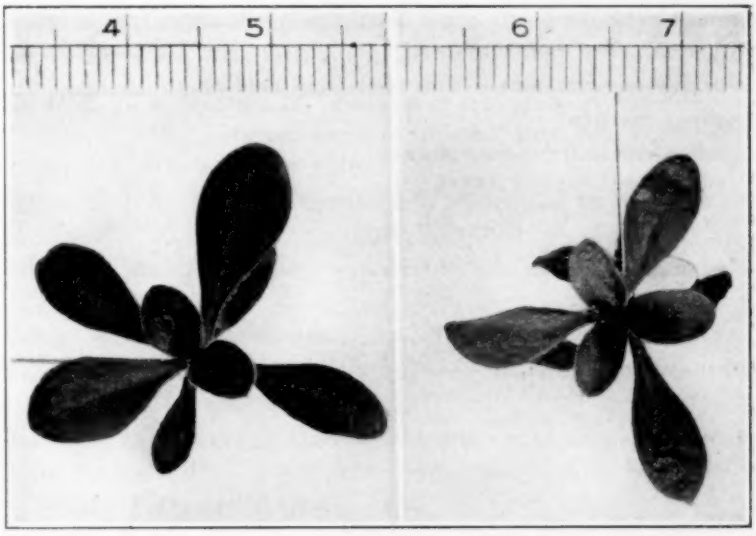

Fig. 1. Fig. 2.

Fig. 1. Normal *Silene noctiflora* seedling with two seed-leaves and two leaves in each succeeding whorl, × 2.

Fig. 2. *Silene noctiflora* seedling with three seed-leaves and three leaves in each of the two succeeding whorls, × 2.

occasion of this sketch produced three seed-leaves and the succeeding leaves were arranged in whorls of three, each leaf of the

new whorl being placed above an interval between leaves of the preceding whorl. FIG. 2 is reproduced from a photograph of this plant.

It is no uncommon thing to find *Silene noctiflora* seedlings with divided seed-leaves. All gradations have been noted from the extreme where both seed-leaves are completely divided, giving the appearance of four seed-leaves, to a partial division of one seed-leaf. When one seed-leaf is divided the seedling has the appearance of a plant with three seed-leaves. In all such monstrosities, however, the leaves which follow the seed-leaves are opposite and the plant is thereafter quite normal. The plant here pictured in FIG. 2 is the first one observed to show a completely altered phyllotaxy.

Silene noctiflora seeds were secured from the Department of Plant Breeding, Cornell University, in the fall of 1916, and an attempt was made to grow seedlings in the garden in 1917. Only one (very much stunted) plant produced seed, due to unfavorable environment. The seed from this plant produced the seedlings pictured.

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INDEX TO AMERICAN BOTANICAL LITERATURE

1911-1918

The aim of this Index is to include all current botanical literature written by Americans, published in America, or based upon American material; the word America being used in the broadest sense.

Reviews, and papers that relate exclusively to forestry, agriculture, horticulture, manufactured products of vegetable origin, or laboratory methods are not included, and no attempt is made to index the literature of bacteriology. An occasional exception is made in favor of some paper appearing in an American periodical which is devoted wholly to botany. Reprints are not mentioned unless they differ from the original in some important particular. If users of the Index will call the attention of the editor to errors or omissions, their kindness will be appreciated.

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